DoD Next Generation Automatic Test System (ATS)

Bill Ross

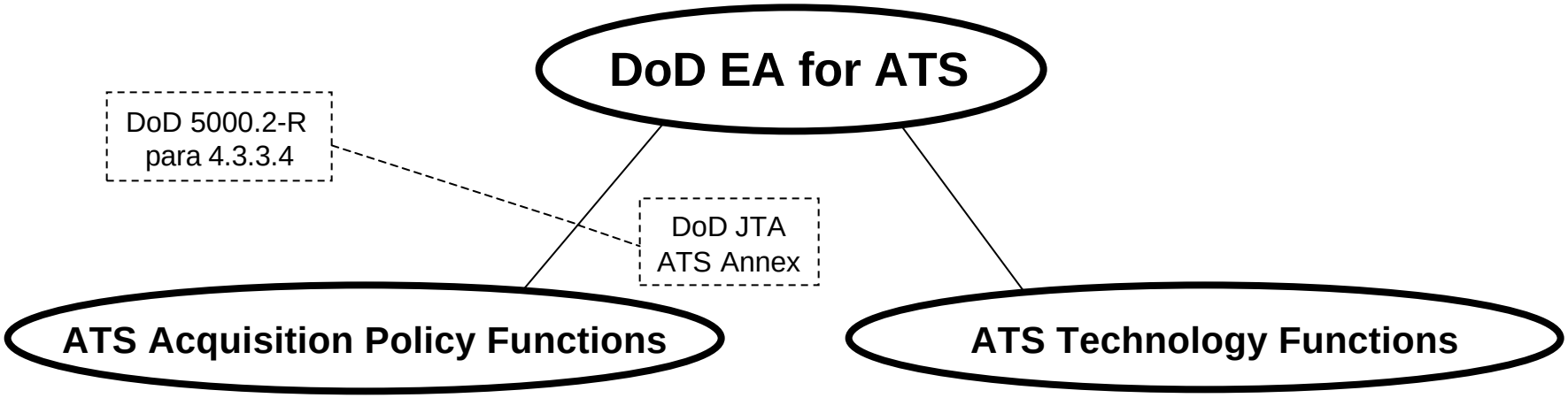
DoD ATS Executive Agent Office

Battle Group Support

ATS Environments

DoD Executive Agent for ATS

Steering the future course of DoD Automatic Test Systems



- Establish Joint implementing processes
- Monitor compliance

- Establish a Joint ATS R&D Program
  - Systems convergence
  - Systems modernization
  - Open Systems Approach

Customers = Weapon System Program Managers throughout DoD

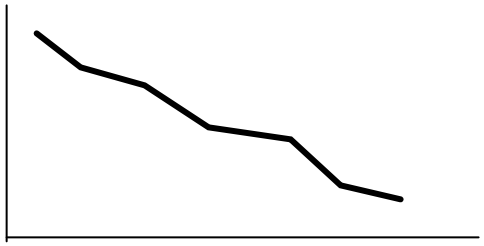
What else is left to do?

ATS Technology Functions

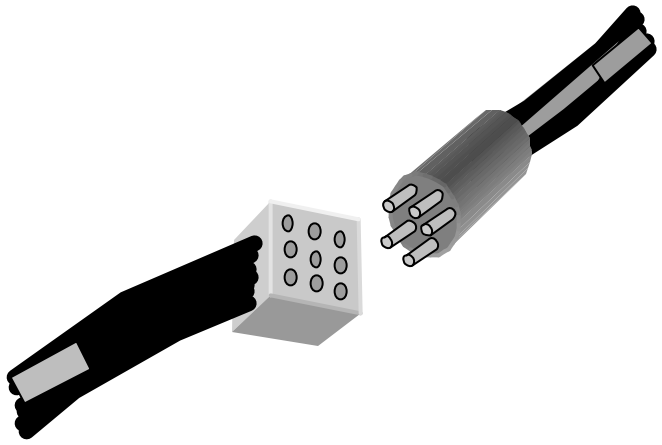
- Complete the ATS Open System Architecture and update the ATS Technical Architecture (JTA)
- Lead and support modernization of DoD ATS Families based on a common DoD test solution
- Work with the Integrated Diagnostics domain to define critical interfaces and specifications in common with the ATS domain
- Participate in ATS-related standards bodies
  - IEEE SCC20
  - VXI Consortium
  - IVI Consortium
  - Test and Diagnostics Consortium
- Lead R&D projects and implementations that effect reduced cost of ownership of DoD ATS and that effect interoperability functions

DoD Automatic Test System Goals

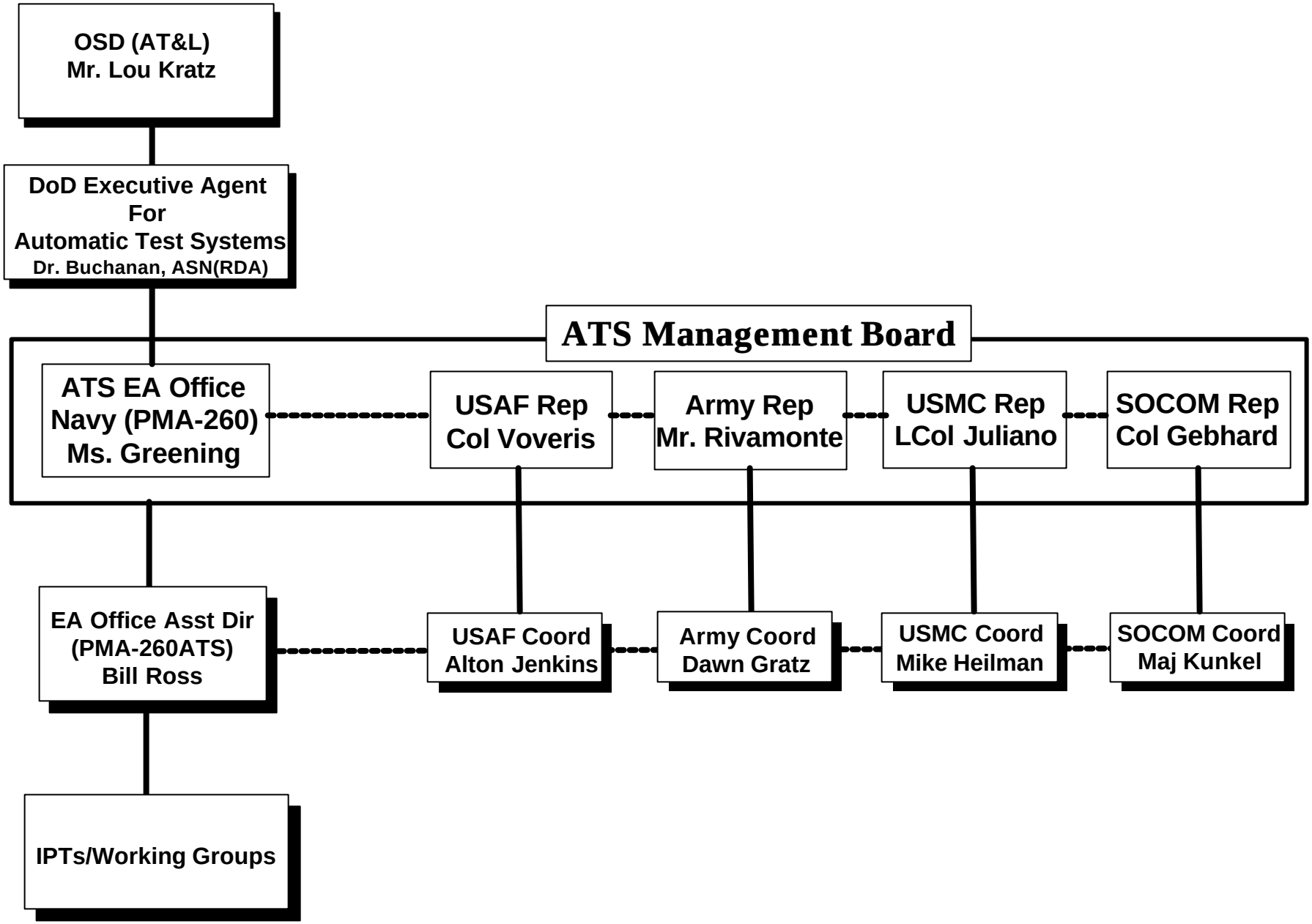
1. **Reduce total cost of ownership of DoD ATS**



2. **Provide greater flexibility to the warfighter through Joint Services interoperable ATS**



DoD ATS Organization



Active IPTs

	Leader
• **Investment Planning IPT**	Will Broadus
• **Program Analysis IPT**	Jim Deffler
• **TPS Standardization IPT**	Ed Holland
• **ATS Research and Development IPT (ARI)**	Mike Malesich
• **NxTest Working Group**	Bill Birurakis

DoD ATS R&D IPT

- Mission:
  - To develop a generic open system architecture for ATS that will support new test needs and permit flexible insertion of updates and new technology with minimum impact on existing ATS components

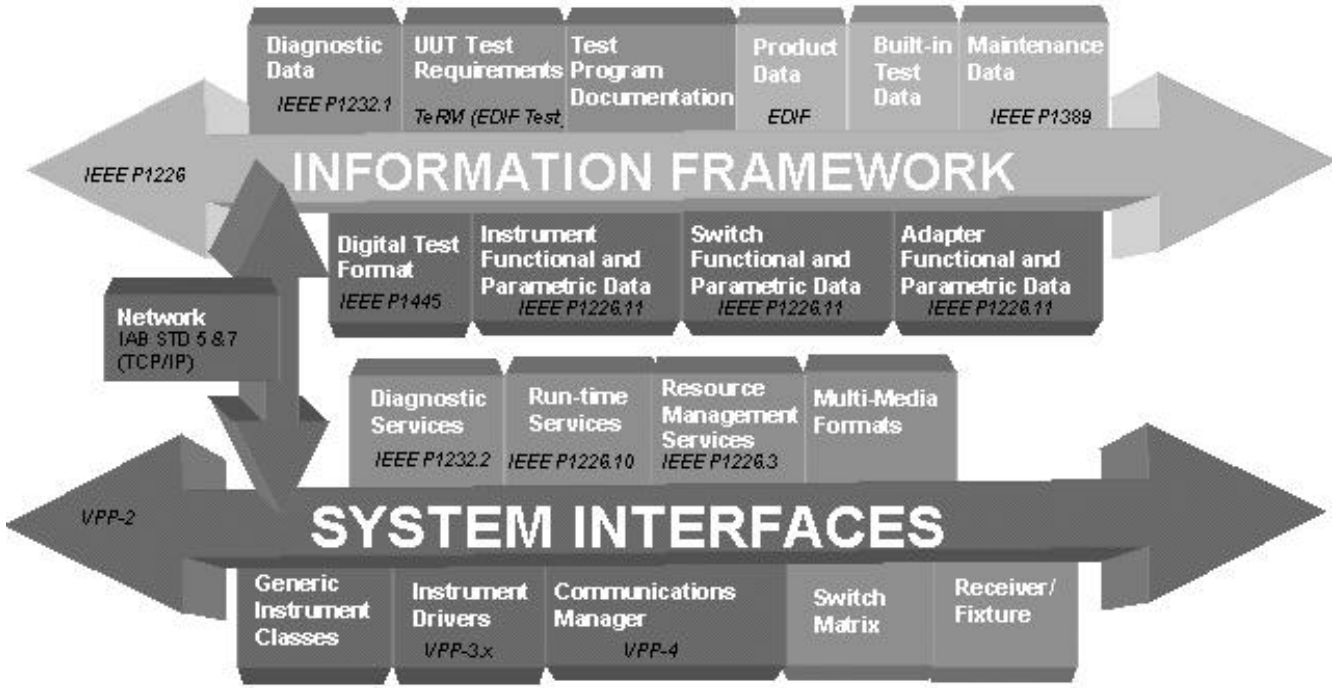
- Membership
  - Navy Chair + Army, USN, USAF, USMC

- Architecture Goals:
  1. Reduce the total cost of ownership of DoD ATS
  2. Provide greater flexibility to the warfighter through Joint Services interoperable ATS

Focus = Architecture

ARI Status

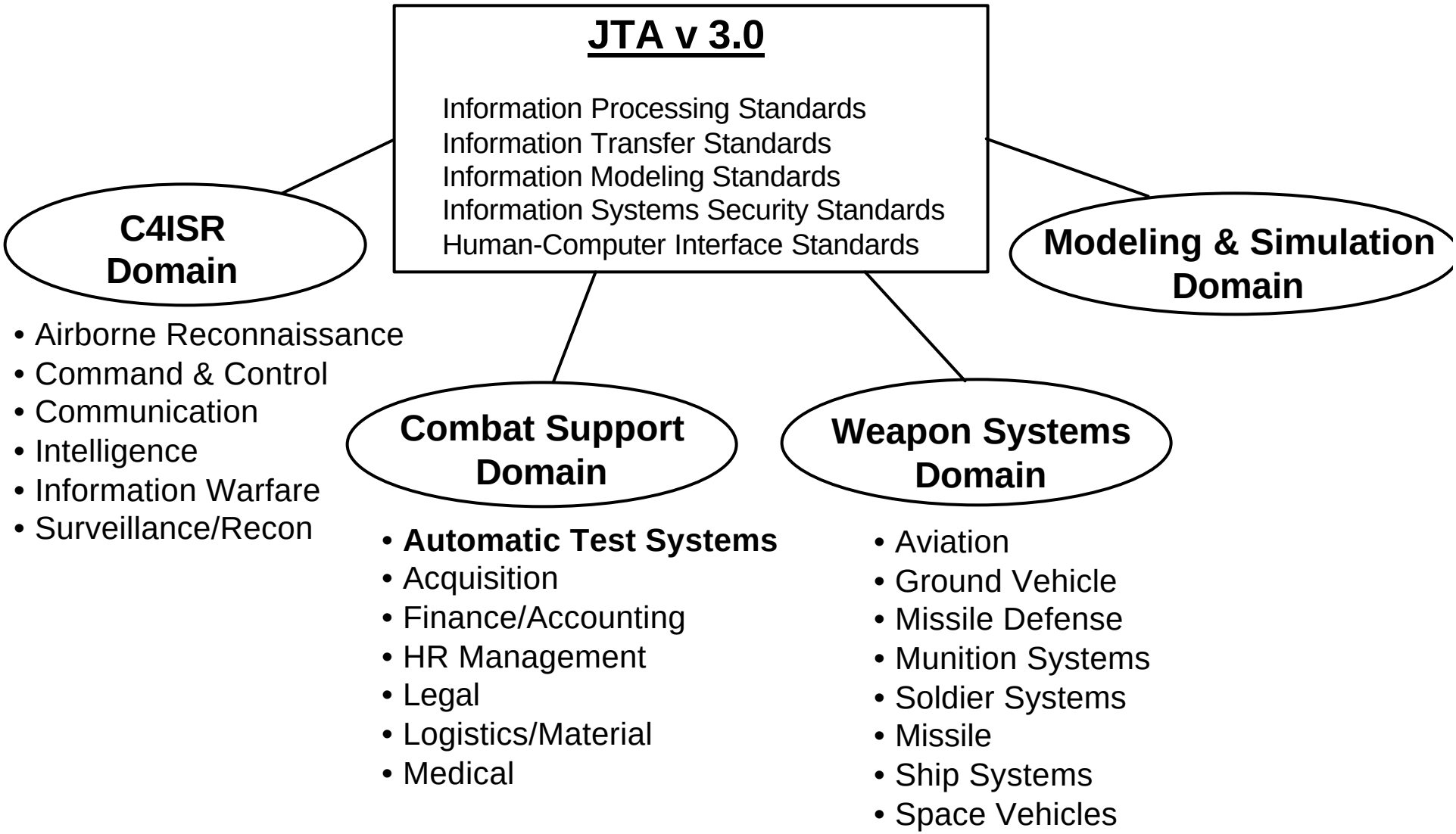
- Architecture has been defined



- Specifications published for 7 of 20 interfaces
- ATS architecture published in the JTA
- Specification development on-going

DoD Joint Technical Architecture

http://www-jta.itsi.disa.mil/



DoD NxTest Working Group

- Mission - Leverage the investments of industry and each Service in testing technology towards uniform implementations within DoD. Optimize on commercial implementations and use of the ARI open architecture.

- Membership – Navy Chair + Army, USAF, Navy, USMC

- NxTest technology goals:
  1. Reduce the total cost of ownership of DoD ATS

  2. Provide greater flexibility to the warfighter through Joint Services interoperable ATS

Focus = Testing Technology

NxTest Tasking

- Define the future DoD automatic test system environment
  - Single **Operational Architecture**
  - Embrace the DoD ATS Joint **Technical Architecture**
  - Different (**System Architecture**) implementations but interoperable
- Cooperative development -- Joint Services
- Leverage development investments -- Services and Industry
- Demonstrate a set of emerging testing technologies
  - Synthetic instruments
  - Tester on a pin
  - Bus simulation
  - Multiple s/w environments
- Better use available diagnostics data

Next Generation ATS Vision

- Open system based on the DoD JTA “mandated” and ARI “emerging” requirements
- Interoperable ATS
  - More easily share TPSs and ATE
  - Share diagnostics infrastructure
  - Multiple run-time systems/languages
- Embrace existing ATS environments - graceful TPS rehosting
- 2/3 reduction in the amount of ATE hardware to acquire and support
- Ease future ATE modernization
- Parallel test processing and multi-threading to allow true “functional” testing
- Better integrated with diagnostics systems and information (network centric)
  - Design data
  - Platform diagnostics data
  - Historical maintenance data
- Improved TPS development environments

Architecture

- **Working with an open industry consortium (TDC)** which allows for the development of the architecture in an open environment

- **Preserving JTA mandate** (derived from several years of industry and DoD working together through the ARI)

- **Evolving through industry's** implementation of new technology

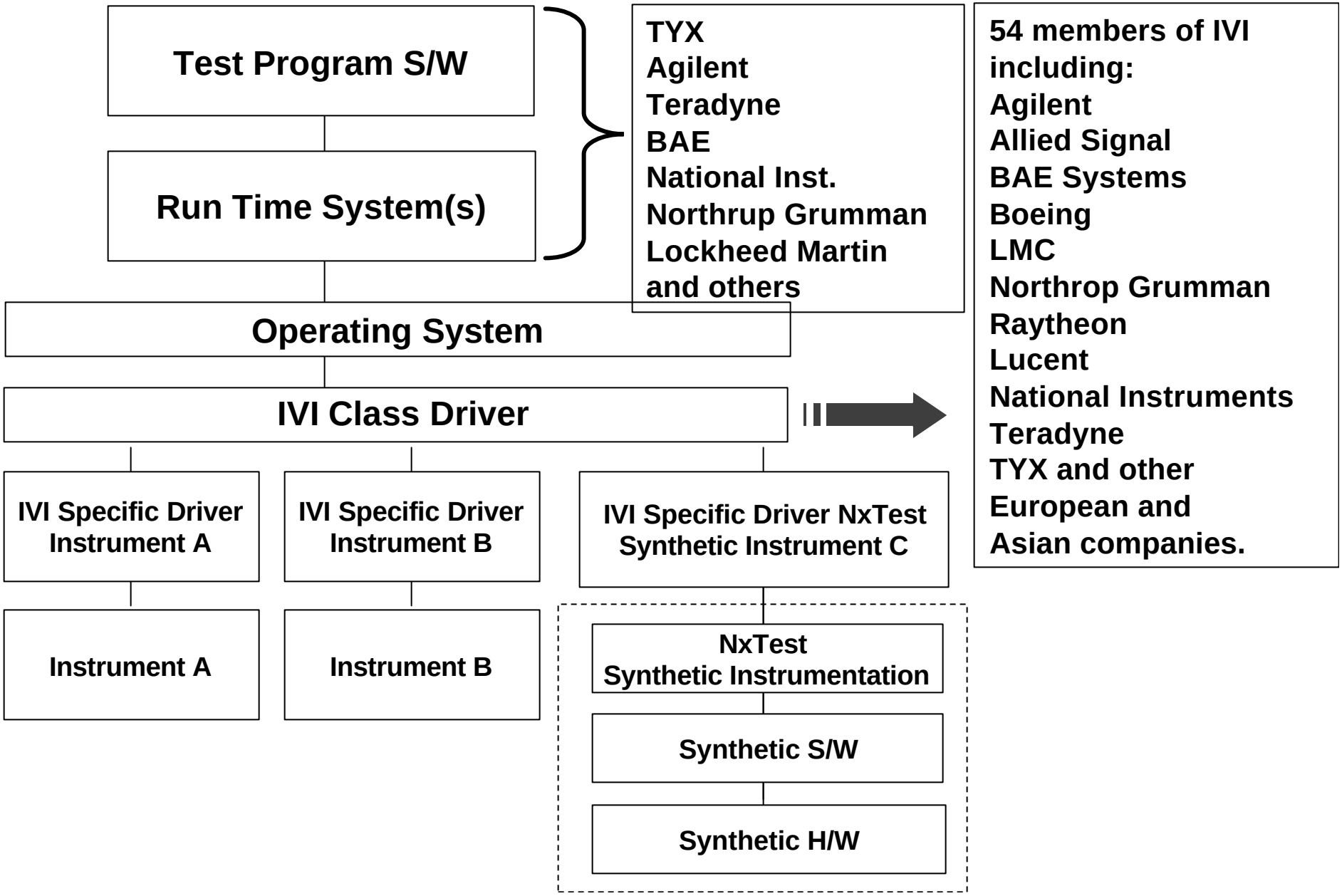
Industry Influence

- Low frequency analog commercial products ARE being developed with our requirements included
  - New analog test technology incorporates initial envelope of DoD test requirements
  - Provides general purpose programmable functional / parallel test capability (improved test and fault coverage)
  - Leads to elimination of individual standard instrument (reduce cost and size)
  - Eliminates switching and TPS adapter wiring (reduce cost and size)
  - Provides migration path from design to test
  - First application funded by COSSI to add capability to CASS to offload IATS (an old single purpose functional ATE)

More Industry Influence

- Microwave frequency commercial products ARE being developed because of our influence
  - MHE and SHE (Measurement and Stimulus Emulator) proof of concept technology funded by PMA-260
  - Will replace many expensive microwave instruments with few (reduce cost and size)
  - Applications to date include commercial satellite test and portable ATE
  - Multiple supplier base development

NxTest Utilizing IVI Interfaces



Defining Future Test Requirements

- Emerging systems will demand support for:
  - Mass Memory Tests
  - New Busses
  - Expanded frequency ranges
  - Electro-Optical expansion (FLIR and LASER)
  - Parallel processing/functional test
  - Multiple runtime/operating environments
  - High speed, high resolution AD/DA technology
  - High resolution Inertial Reference Units for acceleration drift testing

Future Focus

- Continue joint NxTest collaboration
  - Leverage ARI and TDC efforts
  - Leverage/influence commercial investment
  - Finalize requirements
  - Continue market research, concept exploration and development in following areas
    - Interface with emerging Integrated Diagnostics technology
    - Implementation of information technology advances
    - Influence development of new generation of power supplies to reduce size and cost

Impact

- DoD Technology Insertion
  - CASS
  - TETS
  - IFTE
  - Air Force ATS
- Future DoD ATS
  - Air Expeditionary Forces (AEF) Common ATS (ACATS)
  - Rapid Deployable ATS (RDATS)
  - CVNX ATS
  - Navy Depots
- Commercial Application?

Test & Diagnostics Consortium

- 32 member companies and organizations

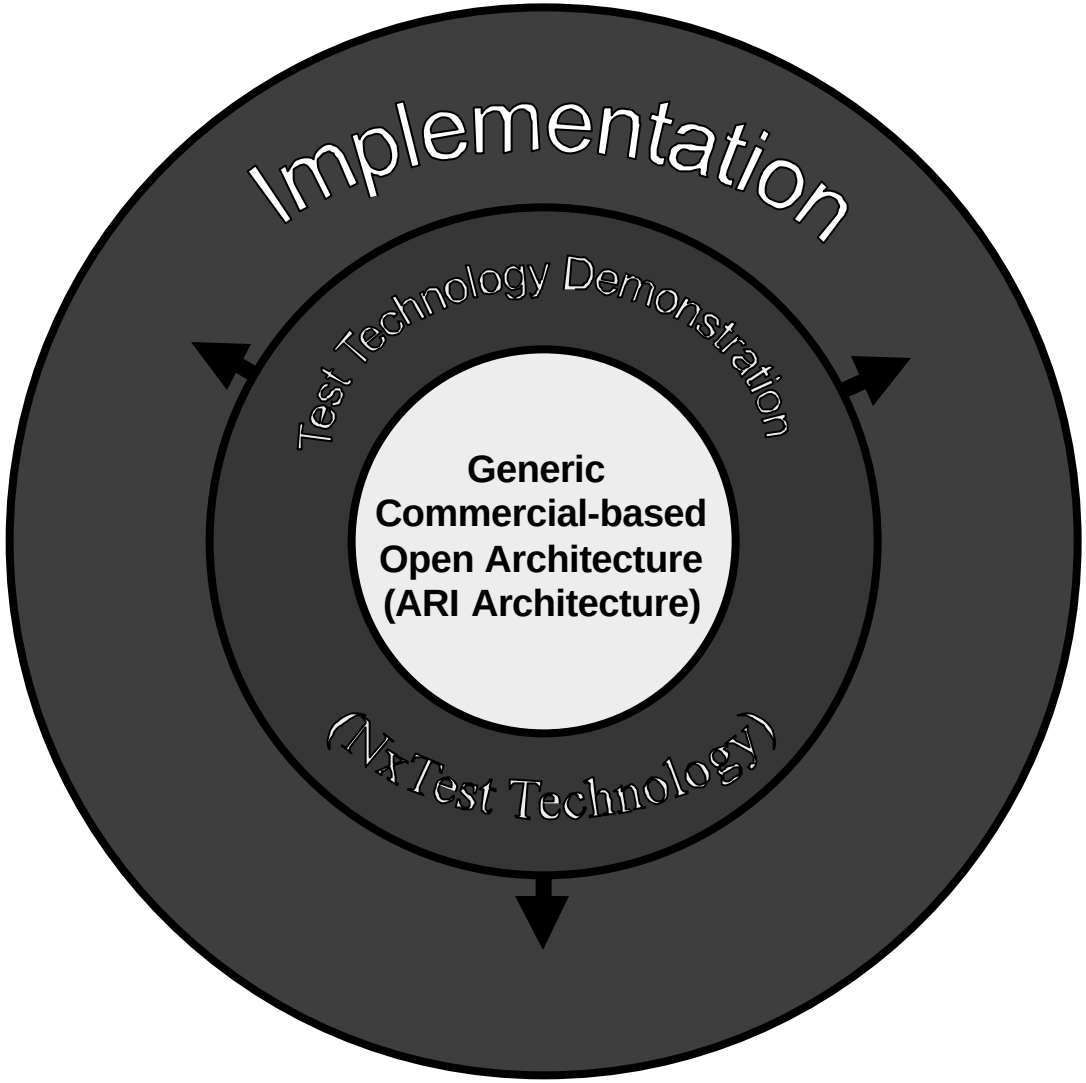
  www.test-diagnostics.org

- First official meeting in March ’00

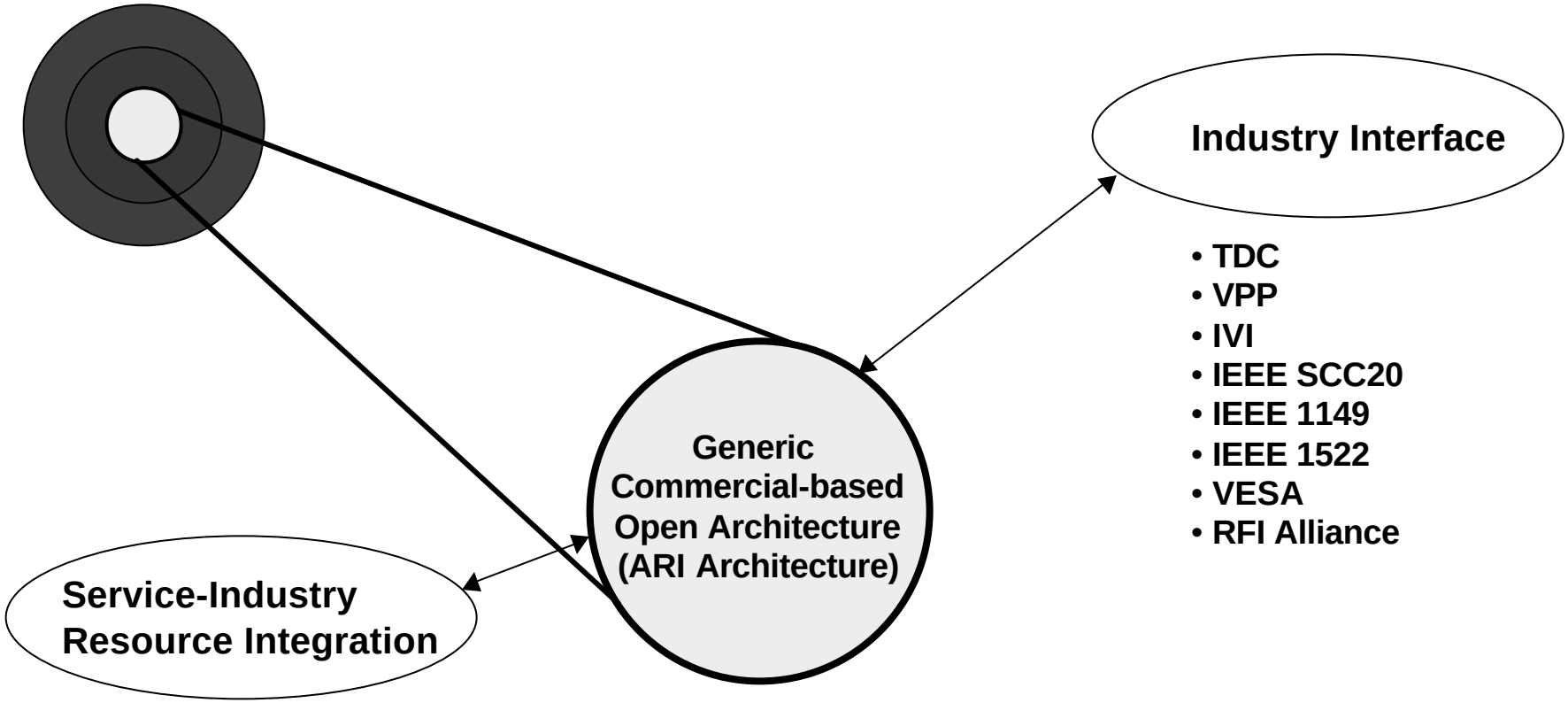
- BOD members and Officers elected
  - Meet regularly via conference call

- TDC offers a vehicle for industry involvement in DoD ATS requirements identification and support

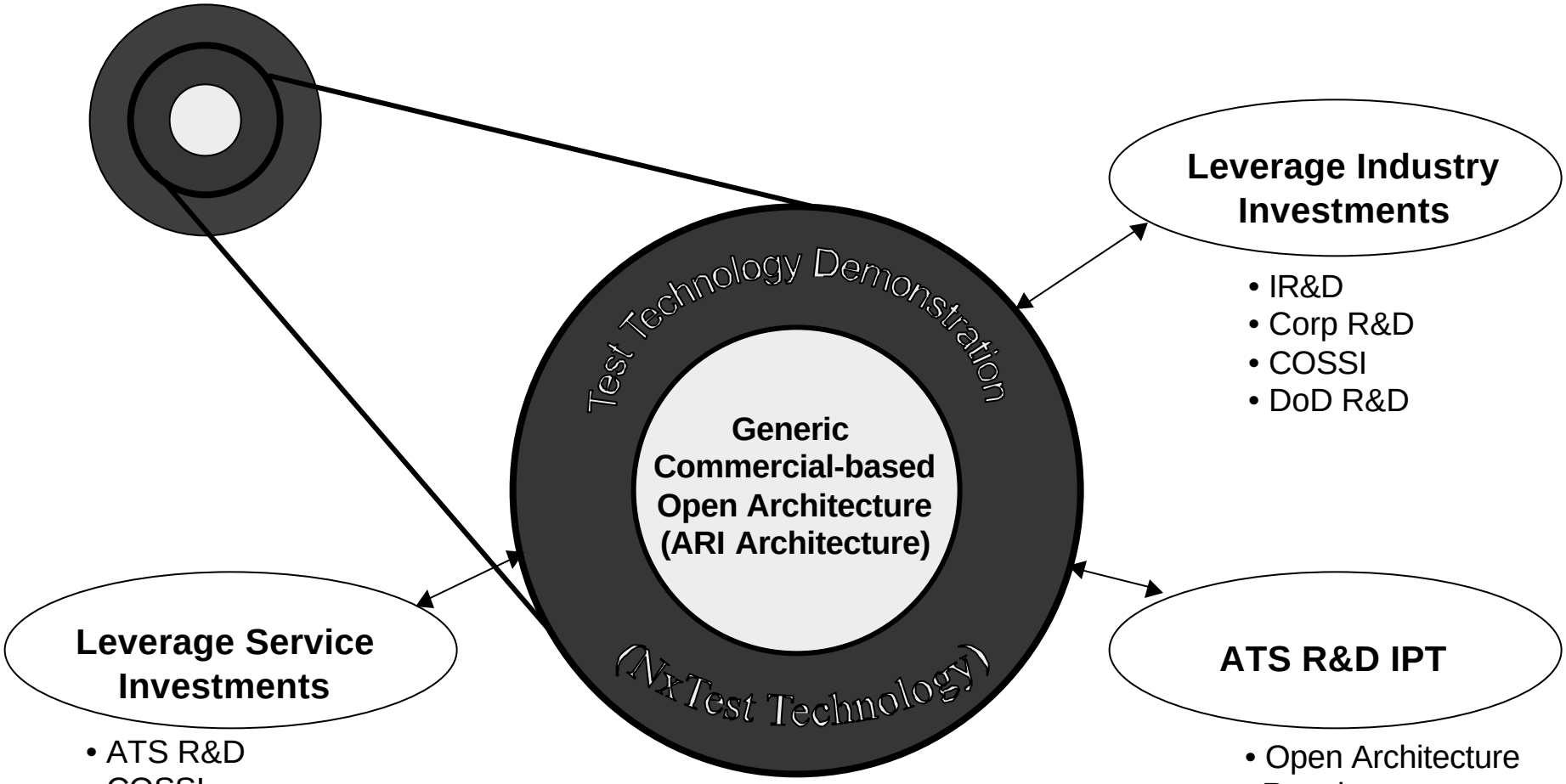
Future State DoD ATS



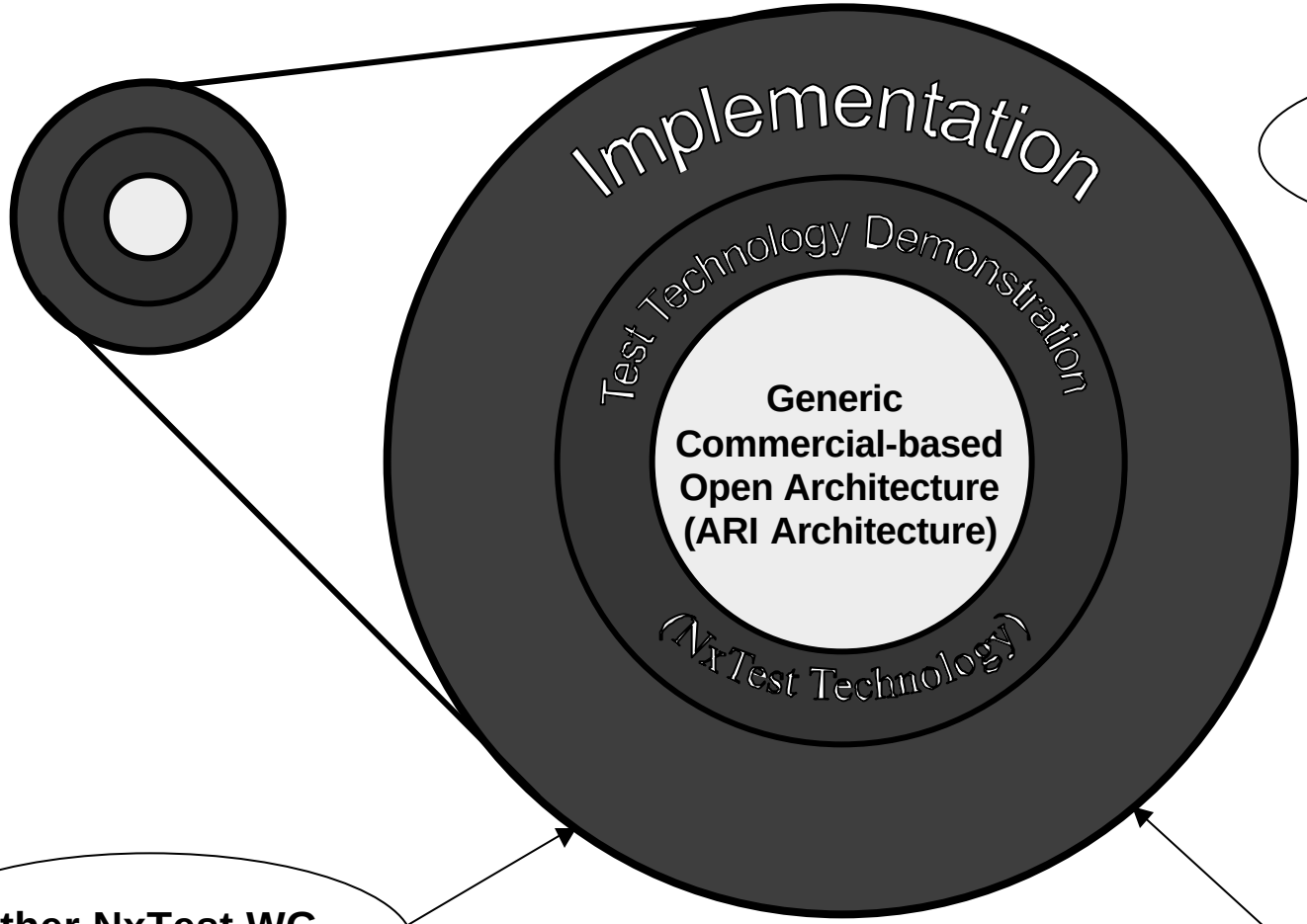
Open Architecture Layer



Test Technology Layer



Implementation Layer



ARI Architecture Requirements

Other NxTest WG Requirements

- Parametric
- Environmental
- Packaging

- **Based on Commercial standards**
- **Forms:**
  - Technology Insertion
  - SLEP
  - Modernization
  - New System

NxTest Technology

Interfaces

NxTest IPT Domain

System Technologies

NxTest Technologies

- Joint Services NxTest IPT
- Concept exploration
- Market research
- Requirements generation
- Implementation facilitation

TDC Domain

Commercial & Industrial Technology and Architecture

TDC Inc.

- Diversified industry base
- User lead
- 32 members; producers and consumers
- Participate in architecture development

ARI Domain

DoD ATS Generic Technical Architecture

ENGINEERING

Commercial Standard ATS Open System Architecture

- Commercial standard
- ARI (Ind/Gov't)
- Continuously evolving

POLICY

"Mandated" & "Emerging" Critical ATS Elements

- DoD JTA • Updated annually

Summary

- **Inter-Service level of cooperation is the best ever**
  - ATS Management Board
  - ATS R&D IPT Jointly defining the technical architecture
  - NxTest Working Group Jointly implementing next generation test technology and defining the system architecture
- **Joining with industry on test technology investments**
  - IR&D and company R&D
  - TDC
  - DoD wants commercial solutions
- **Improved use of existing diagnostics data is a key element**